

Mutagenic Evaluation of Compound FDA 73-84 (Ferric Ortho Phosphate White Food
Grade Phase 1) 6/15/75

D24

LBI PROJECT #2468

**MUTAGENIC EVALUATION OF
COMPOUND FDA 73-84**

010045860

**FERRIC ORTHO PHOSPHATE
WHITE FOOD GRADE PHASE I**

SUBMITTED TO

**FOOD & DRUG ADMINISTRATION
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
ROCKVILLE, MARYLAND**

SUBMITTED BY

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JUNE 15, 1975



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EVALUATION SUMMARY

Compound FDA 73-84, Ferric Ortho Phosphate White Food Grade Phase I, did not exhibit genetic activity in any of the in vitro microbial assays employed in this evaluation.



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DATE: June 15, 1975

SPONSOR: Food and Drug Administration, Contract Number 223-74-2104

SUBJECT: Evaluation of Test Compound 010045860, Ferric Ortho Phosphate
White Food Grade Phase I, FDA 73-84

I. OBJECTIVE

The objective of this study was to evaluate the test compound for genetic activity in microbial assays with and without the addition of mammalian metabolic activation preparations.

II. MATERIALS

A. Test Compound

1. Date Received: August, 1974
2. Description: Fine white powder

B. Indicator Microorganisms

The following strains of indicator microorganisms were used in the evaluation:

Yeast Strain: Saccharomyces cerevisiae, strain D4

Bacteria Strains: Salmonella typhimurium, strains: TA-1535
TA-1537
TA-1538

C. Reaction Mixture

The following reaction mixture was employed in the activation tests:

<u>Component</u>	<u>Final Concentration/ml</u>
1. TPN (sodium salt)	6 μ M
2. Isocitric acid	49 μ M
3. Tris buffer, pH 7.4	28 μ M
4. $MgCl_2$	1.7 μ M
5. Tissue homogenate fraction	72 mg



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D. Tissue Homogenates and Supernatants

The tissue homogenates and 9,000 x g supernatants were prepared from tissues of the following mammalian species: Mouse-ICR random bred adult males; rat-Sprague-Dawley adult males; and primate-Macaca mulatta adult males.

E. Positive Control Compounds

Table 1 lists chemicals for positive controls in the direct and activation assays.

TABLE 1
POSITIVE CONTROLS USED IN DIRECT AND ACTIVATION ASSAYS

<u>Assay</u>	<u>Chemical^a</u>	<u>Solvent</u>	<u>Probable Mutagenic Specificity</u>
Nonactivation	Ethyl methanesulfonate	Water or saline	BPS ^b
	2-Nitrofluorene	Dimethylsulfoxide ^c	FS ^b
	Quinacrine mustard	Water or saline	FS ^b
Activation	Dimethylnitrosamine	Water or saline	BPS ^b
	2-Acetylaminofluorene	Dimethylsulfoxide ^c	FS ^b

^a Concentrations given in the Results Section

^b BPS = base-pair substitution; FS = frameshift

^c Previously shown to be non-mutagenic

III. METHODS

A. Toxicity

The solubility, toxicity and doses for all chemicals were determined prior to screening.

Each chemical was tested for survival against the specific indicator strains over a range of doses to determine the 50% survival dose. Bacteria were tested in phosphate buffer, pH 7.4, for one hour at 37°C on a shaker. Yeasts were tested in phosphate buffer, pH 7.4, for four hours at 30°C on a shaker. The 50% survival curve and the 1/4 and 1/2 50% doses calculated.

If no toxicity was obtained for a chemical with a given strain, then a maximum dose of 5% (w/v) was used against the strain.

Unless otherwise specified, the doses calculated for the tests in buffer were applied to the activation tests. The solubility of the test chemical under treatment conditions is stated in the Results Section.



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B. Plate Tests

In the nonactivation procedure, approximately 10^9 cells of a log phase culture of the bacterial indicator strains were spread over the surface of a minimal plate, and a measured amount of the test chemical was placed in the center of the test plate. In activation tests, the test chemical was added to the cells, and an aliquot of the mixture was spread on the surface of the test plate. The reaction mixture (0.1 ml) plus tissue extract was then spotted on the surface of the plate. Positive and solvent controls were included. All plates were incubated at 37°C for four days and then scored. Each compound (Test, Positive Control and Solvent Control) was done in duplicate. Concentrations of the positive control compounds are listed in the Results Section.

C. Suspension Tests

1. Nonactivation

Log-phase bacteria and stationary-phase yeast cultures of the indicator organisms were grown in complete broth, washed and resuspended in 0.9% saline to densities of 1×10^9 cells/ml and 5×10^7 cells/ml, respectively. This constituted the working stock for tests of a group of test chemicals and their respective controls. Tests were conducted in plastic tissue culture plates. Cells plus appropriate volume(s) of the test chemical were added to the wells to give a final volume of 1.5 ml. The solvent replaced the test chemical in the negative controls. Treatment was at 30°C for four hours for yeast tests and at 37°C for one hour for bacterial tests. All flasks were shaken during treatment. Following treatment, the plates were set on ice. Aliquots of cells were removed, diluted in sterile saline (4°C) and plated on the appropriate complete media. Undiluted samples from flasks containing the bacteria were plated on minimal selective medium in reversion experiments. Samples from a 10^{-1} dilution of treated cells were plated on the selected media for enumeration of gene conversion with strain D4. Bacterial plates were scored after incubation for 48 hours at 37°C. The yeast plates were incubated at 30°C for 3-5 days before scoring.

2. Activation

Bacteria and yeast cells were grown and prepared as described in the nonactivation tests. Measured amounts of the test and control chemicals plus 0.25 ml of the stock-cell suspension were added to wells of the Linbro plate containing the appropriate tissue fraction and reaction mixture. All flasks (bacteria and yeast) were incubated at 37°C in an oxygen atmosphere with shaking. The treatment times as well as the dilutions, plating procedures and scoring of the plates were the same as described for nonactivation tests.



D. Preparation of Tissue Homogenates and 9,000 x g Cell Fractions

Male animals (sufficient to provide the necessary quantities of tissues) were killed by cranial blow, decapitated and bled. Organs were immediately dissected from the animal using aseptic techniques and placed in ice-cold 0.25 M sucrose buffered with Tris at pH of 7.4. Upon collection of the desired quantity of organs, they were washed twice with fresh buffered sucrose and completely homogenized with a motor-driven homogenizing unit at 4°C. The whole organ homogenate obtained from this step was divided into two samples. One sample was frozen at -80°C and the other was centrifuged for 20 minutes at 9,000 x g in a refrigerated centrifuge. The supernatant from the centrifuged sample was retained and frozen at -80°C. These two frozen samples were used for the activation studies.

E. Data Recording and Reporting

Following the specified incubation periods all population plates were scored by an automatic colony counter and the results from each plate of a set were recorded, in ink, on data processing forms. All minimal or other types of selective media plates were hand scored and the results recorded along with the respective population data. Other relevant experimental data were recorded on experimental definition forms. For bacteria strains the number of colonies recorded from either the population or selective plates represents that number in 1 ml of test suspension plated. The numbers recorded for the yeast strain D4 represent the number in 0.5 ml of test suspension plated. The data were then processed and printed from a computer program.



IV. RESULTS SECTION

A. Solubility Properties of the Test Compound

1. Name or code designation of the test compound: 010045860
Ferric Ortho Phosphate White Food Grade Phase I
2. Test solvent: Saline
3. Solubility of the test compound under treatment conditions:
Insoluble under treatment conditions.
4. Additional comments: Fine white powder

B. Toxicity and Dosage Determinations for the Test Compound

1. Test date for toxicity determination: March 25, 1975
2. The 50% survival level was determined for bacteria and yeast indicator organisms by conducting survival curves with the test compound at the following concentrations:

Percent Concentration (w/v or v/v)

3.0
0.3
0.03
0.003
0.0003

3. Concentrations of the test compound used in the mutagenicity tests:

Dose	<u>Percent Concentration</u>	
	Bacteria	Yeast
1/4 50% Survival	1.0	1.25
1/2 50% Survival	2.0	2.50
50% Survival	4.0	5.00
Plate Tests	2.0	--



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V. SUMMARY OF TEST RESULTS

Plate Tests

A. Name or code designation of the test compound: 010045860

B. Test date: April 30, 1975

C. Concentration of the test compound: 2.0%

Test	Species	Tissue	Revertants/Plate					
			TA-1535		TA-1537		TA-1538	
			<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>
1. <u>Nonactivation</u>								
Solvent Control	---	---	138	146	25	22	26	35
Positive Control ^a	---	---	>10 ⁴	>10 ⁴	193	176	158	219
Test Compound	---	---	140	189	26	16	44	45
2. <u>Activation</u>								
Negative Control	---	---	56	74	9	25	28	16
Solvent Control	---	---	44	84	46	41	44	39
Reaction Mixture Control	---	---	83	72	35	42	30	43
Positive Control ^b	Mouse	Liver	>10 ³	>10 ³	86	94	332	341
Positive Control		Lung	96	87	9	11	43	80
Positive Control		Testes	84	121	10	17	22	26
Positive Control	Rat	Liver	>10 ³	>10 ³	85	86	382	310
Positive Control		Lung	87	72	8	14	27	21
Positive Control		Testes	84	116	11	15	19	36
Positive Control	Monkey	Liver	345	339	93	88	340	364
Positive Control		Lung	81	73	11	10	14	24
Positive Control		Testes	87	115	9	19	19	28
Test Compound	Mouse	Liver	58	67	18	18	28	26
Test Compound		Lung	43	66	9	12	30	33
Test Compound		Testes	72	70	18	18	20	26
Test Compound	Rat	Liver	55	60	21	20	25	28
Test Compound		Lung	59	72	11	12	25	31
Test Compound		Testes	71	73	17	12	21	23
Test Compound	Monkey	Liver	60	63	18	14	22	31
Test Compound		Lung	44	65	9	13	24	21
Test Compound		Testes	73	68	14	12	20	18

a TA-1535 EMS 10 μ l/plate
 TA-1537 QM 20 μ g/plate
 TA-1538 NF 100 μ g/plate

b TA-1535 DMNA 50 μ M/plate
 TA-1537 AAF 100 μ g/plate
 TA-1538 AAF 100 μ g/plate



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DATA TABLE TERMS AND ABBREVIATIONS

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
COMPOUND	Client designated compound number appears in this column.
TEST CODES	<div data-bbox="667 430 1555 562"> <p>NAN = Nonactivation: Solvent Control</p> <p>NAP = Nonactivation: Positive Control</p> <p>NA1 = Nonactivation: Test Compound Dose 1</p> <p>NA2, etc. = Reflects the other dose level(s)</p> </div> <div data-bbox="667 592 1442 758"> <p>A+C = Negative Chemical Control</p> <p>A-C = Activation: Solvent Control</p> <p>ACP = Activation: Positive Control</p> <p>ACT = Activation: Test Compound</p> <p>A+T = Activation: Tissue Control</p> </div> <div data-bbox="667 787 1511 947"> <p>LI = Liver Tissue Activation Fraction</p> <p>LU = Lung Tissue Activation Fraction</p> <p>KI = Kidney Tissue Activation Fraction</p> <p>TE = Testes Tissue Activation Fraction</p> <p>1,2, etc. = Dose Levels</p> </div>
CONCENTRATION	<p>All test compound dose levels are expressed as a whole number followed by an exponent (negative) identified by the appropriate units.</p> <p>Example: 0025-2PCT = 0.25 percent concentration</p>
POPU	Total number of viable cells in the plating sample raised to some exponent printed directly below the abbreviation (i.e., EP + 6 = $\times 10^6$).
MUT 1	Total number of mutants or convertants obtained from the sample plated raised to some exponent printed directly below the abbreviation (i.e., EP + 0 = 10^0). For strain D4, MUT 1 represents the number of ADE+ convertants.
MUT 2	Only used for strain D4 and represents the number of TRY+ convertants in the plated sample.
FREQ 1	The calculated mutation or gene conversion frequency times the negative exponent written directly below. For strain D4, FREQ 1 represents the ADE+ value.
FREQ 2	Only used for strain D4 and represents the TRY+ conversion frequency.
CONTAM	Presence of contamination on any plates.



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DATA TABLE TERMS AND ABBREVIATIONS (continued)

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
AAF	2-Acetylaminofluorene
DMSO	Dimethylsulfoxide
DMN	Dimethylnitrosamine
EMS	Ethyl Methanesulfonate
QM	Quinacrine Mustard
NF	Nitrofluorene
SPECIES	Animal Strains
SPRDAW	Sprague Dawley Rats
ICRFLO	Flow ICR Random Bred Mice
RHESUS	Rhesus Monkey (<u>Macaca mulatta</u>)
MIXEDB	Dog, Mixed Breed
NEWZEA	New Zealand White Rabbit



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/11/75

SPECIES / COMPOUND 010045860

TEST	ORG	TA1537 HIS EX-8	TA1538 HIS EX-8	TA1535 HIS EX-8	000004 ADE EX-5	000004 TRY EX-5
NAN		5.32	1.24	12.94	1.89	1.48
NAP		1764.20	922.93	771.32	129.05	155.87
NA1		3.80	1.19	1.66	2.28	4.04
NA2		3.14	1.00	4.42	2.18	2.35



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/11/75

SPECIES ICRFLO/MOUSE

COMPOUND 010045860

TEST	ORG	TA1537 HIS EX-8	TA1535 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	20.45	3.23	6.88	2.25	1.59
ACT	A+T	35.90	7.69	6.31	3.25	1.59
ACT	A-C	12.22	3.73	2.93	0.96	0.17
ACT	PLI	45.07	5496.88	15.26	7.59	6.16
ACT	PLU	20.50	4.79	4.48	2.42	2.60
ACT	PTE	28.79	9.15	2.33	3.81	2.06
ACT	LI1	5.06	0.71	2.60	4.68	2.39
ACT	LI2	10.56	0.68	3.73	2.87	3.07
ACT	LU1	13.32	0.92	2.16	2.04	2.50
ACT	LU2	18.06	1.57	1.24	3.31	2.27
ACT	TE1	7.74	4.08	1.12	4.34	2.04
ACT	TE2	9.17	6.85	2.06	6.28	2.22



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/11/75

SPECIES SPRDAW/RAT

COMPOUND 010045860

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	TA1537 HIS EX-8	TA1537 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	4.48	10.86	4.75			2.85	1.11
ACT	A+T	2.48	10.31	6.57			2.43	1.66
ACT	A-C	5.52	8.87	9.05	10.92	10.34	2.68	1.44
ACT	PLI	333.15	17.19	20.33			4.50	4.42
ACT	PLU	6.11	14.09	8.76			2.49	1.03
ACT	PTE	8.60	11.40	6.77			3.24	1.66
ACT	LI1	1.33	8.80	8.50		7.64	3.27	2.34
ACT	LI2	2.86	17.27	12.57		8.01	1.92	1.44
ACT	LU1	4.71	9.02	8.36		5.93	1.83	2.03
ACT	LU2	6.67	14.59	8.36	8.58	81.13	1.82	1.48
ACT	TE1	3.55	12.13	5.26		6.41	1.73	1.56
ACT	TE2	7.22	18.79	6.68		9.14	2.87	0.82



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LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 07/11/75

SPECIES RHESUS/MONKEY

COMPOUND 010045860

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	4.50	6.36	10.43	1.82	1.82
ACT	A+T	5.62	3.92	5.80	2.59	2.73
ACT	A-C	7.72	5.63	2.70	2.16	1.80
ACT	PLI	1194.98	10.56	54.55	6.38	3.75
ACT	PLU	5.81	5.60	5.22	2.40	2.64
ACT	PTE	3.99	8.26	6.61	5.41	2.30
ACT	LI1	4.80	3.16	7.12	3.46	1.11
ACT	LI2	3.06	5.56	5.88	2.57	1.61
ACT	LU1	3.11	3.37	2.10	1.83	2.86
ACT	LU2	2.79	4.60	2.69	2.00	2.23
ACT	TE1	1.31	4.85	3.98	1.85	3.00
ACT	TE2	3.05	5.56	4.46	1.43	2.14



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VI. INTERPRETATION OF RESULTS AND CONCLUSIONS

Compound 010045860, Ferric Ortho Phosphate White Food Grade Phase I, was tested for genetic activity in a series of in vitro microbial assays with and without metabolic activation. The following results were obtained:

A. Salmonella typhimurium

1. Plate tests

At a concentration of 2.0%, 010045860, was not mutagenic for any of the bacterial indicator strains with or without activation. A high number of spontaneous revertants were observed in the nonactivation test using TA-1535. This culture was replaced.

2. Nonactivation suspension tests

The results of these tests were negative.

3. Activation suspension tests

The results of these tests were negative. The dose levels with TA-1537 using rat tissue were high, but the repeat tests were negative with the exception of the LU2 dose level, the response of which was probably due to contamination. The second repeat test of this dose level was negative.

B. Saccharomyces cerevisiae

1. Nonactivation suspension tests

The results of these tests were negative.

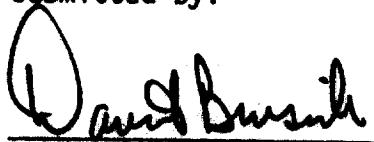
2. Activation suspension tests

The results of these tests were negative.

C. Conclusions

The test compound Ferric Ortho Phosphate White Food Grade Phase I, did not exhibit genetic activity in any of the assays employed in this investigation.

Submitted by:



David Brusick, Ph.D.
Director of Genetics



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APPENDIX
Tabulation of Data



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

		CONTRACT 22374-2104		PROJECT 02468		DATE - 07/11/75	
EXPERIMENT 509802		DETECTOR TA1535		SPECIES /			
COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	0487	0063	12.94	0
	NAP		EMS 0.002 %	0537	4142	771.32	0
010045860	NA1		0002-0 PCT.	0664	0011	1.66	0
010045860	NA2		0001-0 PCT.	0430	0019	4.42	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104
EXPERIMENT 511301 DETECTOR TA1537 SPECIES PROJECT 02468
/

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	0601	0032	5.32	0
	NAP		QM 1.0 UG/ML	0257	4534	1764.20	0
010045860	NA1		0002-0 PCT.	0685	0026	3.80	0
010045860	NA2		0001-0 PCT.	0797	0025	3.14	2



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

		CONTRACT 22374-2104				PROJECT 02468	
EXPERIMENT 509803		DETECTOR TA1538		SPECIES		/	DATE - 07/11/75
COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		DMSO	0563	0007	1.24	0
	NAP		NF 125 UG-ML	0567	5233	922.93	0
010045860	NA1		0002-0 PCT.	0589	0007	1.19	0
010045860	NA2		0001-0 PCT.	0601	0006	1.00	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

		CONTRACT 22374-2104		PROJECT 02468				DATE - 07/11/75	
EXPERIMENT 514705		DETECTOR 0000D4		SPECIES /					
COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	NAN		SALINE	0741	0014	0011	1.89	1.48	0
	NAP		EMS 1.0 %	0179	0231	0279	129.05	155.87	0
010045860	NA1		0025-1 PCT.	0570	0013	0023	2.28	4.04	0
010045860	NA2		0125-2 PCT.	0597	0013	0014	2.18	2.35	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 509401 DETECTOR TA1535 SPECIES ICRFLO/MOUSE

DATE-- 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0650	0021	3.23	0
	A+T		***NO MATCH***	0156	0012	7.69	0
	A-C		SALINE	0670	0025	3.73	1
	ACP	LI	DMN 50 UM/ML	0096	5277	5496.88	0
	ACP	LU	DMN 50 UM/ML	0313	0015	4.79	0
	ACP	TE	DMN 50 UM/ML	0153	0014	9.15	0
010045860	ACT	LI1	0002-0 PCT.	0565	0004	0.71	2
010045860	ACT	LI2	0001-0 PCT.	0292	0002	0.68	2
010045860	ACT	LU1	0002-0 PCT.	0758	0007	0.92	0
010045860	ACT	LU2	0001-0 PCT.	0574	0009	1.57	2
010045860	ACT	TE1	0002-0 PCT.	0539	0022	4.08	2
010045860	ACT	TE2	0001-0 PCT.	0292	0020	6.85	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517602 DETECTOR TA1537 SPECIES ICRFLO/MOUSE

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0308	0063	20.45	0
	A+T		***NO MATCH***	0078	0028	35.90	1
	A-C		DMSO	0483	0059	12.22	0
	ACP	LI	AAF 800 UG/ML	0071	0032	45.07	1
	ACP	LU	AAF 800 UG/ML	0161	0033	20.50	0
	ACP	TE	AAF 800 UG/ML	0198	0057	28.79	0
010045860	ACT	LI1	0002-0 PCT.	0415	0021	5.06	0
010045860	ACT	LI2	0001-0 PCT.	0341	0036	10.56	0
010045860	ACT	LU1	0002-0 PCT.	0443	0059	13.32	2
010045860	ACT	LU2	0001-0 PCT.	0310	0056	18.06	2
010045860	ACT	TE1	0002-0 PCT.	0310	0024	7.74	0
010045860	ACT	TE2	0001-0 PCT.	0229	0021	9.17	2



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 509701 DETECTOR TA1538 SPECIES ICRFLO/MOUSE

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0858	0059	6.88	0
	A+T		***NO MATCH***	0666	0042	6.31	0
	A-C		DMSO	0819	0024	2.93	0
	ACP	LI	AAF 800 UG/ML	0675	0103	15.26	0
	ACP	LU	AAF 800 UG/ML	1026	0046	4.48	2
	ACP	TE	AAF 800 UG/ML	0945	0022	2.33	0
010045860	ACT	LI1	0002-0 PCT.	0616	0016	2.60	2
010045860	ACT	LI2	0001-0 PCT.	0456	0017	3.73	0
010045860	ACT	LU1	0002-0 PCT.	0741	0016	2.16	2
010045860	ACT	LU2	0001-0 PCT.	0806	0010	1.24	2
010045860	ACT	TE1	0002-0 PCT.	0986	0011	1.12	2
010045860	ACT	TE2	0001-0 PCT.	0827	0017	2.06	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 512601 DETECTOR 0000D4 SPECIES ICRFLO/MOUSE DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0755	0017	0012	2.25	1.59	0
	A+T		***NO MATCH***	1260	0041	0020	3.25	1.59	6
	A-C		SALINE	1145	0011	0002	0.96	0.17	0
	ACP	LI	DMN 90 UM/ML	0909	0069	0056	7.59	6.16	6
	ACP	LU	DMN 90 UM/ML	1117	0027	0029	2.42	2.60	0
	ACP	TE	DMN 90 UM/ML	0970	0037	0020	3.81	2.06	6
010045860	ACT	LI1	0025-1 PCT.	0877	0041	0021	4.68	2.39	6
010045860	ACT	LI2	0125-2 PCT.	1011	0029	0031	2.87	3.07	7
010045860	ACT	LU1	0025-1 PCT.	1080	0022	0027	2.04	2.50	0
010045860	ACT	LU2	0125-2 PCT.	1057	0035	0024	3.31	2.27	0
010045860	ACT	TE1	0025-1 PCT.	1175	0051	0024	4.34	2.04	6
010045860	ACT	TE2	0125-2 PCT.	1083	0068	0024	6.28	2.22	6



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 510801 DETECTOR TA1535 SPECIES SPRDAW/RAT

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0692	0031	4.48	0
	A+T		***NO MATCH***	0483	0012	2.48	3
	A-C		SALINE	0725	0040	5.52	0
	ACP	LI	DMN 50 UM/ML	0368	1226	333.15	1
	ACP	LU	DMN 50 UM/ML	0311	0019	6.11	0
	ACP	TE	DMN 50 UM/ML	0349	0030	8.60	0
010045860	ACT	LI1	0002-0 PCT.	0824	0011	1.33	2
010045860	ACT	LI2	0001-0 PCT.	0489	0014	2.86	2
010045860	ACT	LU1	0002-0 PCT.	0510	0024	4.71	0
010045860	ACT	LU2	0001-0 PCT.	0525	0035	6.67	0
010045860	ACT	TE1	0002-0 PCT.	0564	0020	3.55	0
010045860	ACT	TE2	0001-0 PCT.	0540	0039	7.22	2



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 511501 DETECTOR TA1537 SPECIES SPRDAW/RAT

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0663	0072	10.86	0
	A+T		***NO MATCH***	0446	0046	10.31	0
	A-C		DMSO	0688	0061	8.87	0
	ACP	LI	AAF 800 UG/ML	0512	0088	17.19	2
	ACP	LU	AAF. 800 UG/ML	0589	0083	14.09	0
	ACP	TE	AAF 800 UG/ML	0544	0062	11.40	0
010045860	ACT	LI1	0002-0 PCT.	0284	0025	8.80	2
010045860	ACT	LI2	0001-0 PCT.	0220	0038	17.27	1
010045860	ACT	LU1	0002-0 PCT.	0255	0023	9.02	0
010045860	ACT	LU2	0001-0 PCT.	0233	0034	14.59	0
010045860	ACT	TE1	0002-0 PCT.	0239	0029	12.13	2
010045860	ACT	TE2	0001-0 PCT.	0165	0031	18.79	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 515408 DETECTOR TA1537 SPECIES SPRDAW/RAT

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	0812	0084	10.34	0
010045860	ACT	LI1	0002-0 PCT.	0432	0033	7.64	0
010045860	ACT	LI2	0001-0 PCT.	0312	0025	8.01	0
010045860	ACT	LU1	0002-0 PCT.	0658	0039	5.93	0
010045860	ACT	LU2	0001-0 PCT.	0551	0447	81.13	1
010045860	ACT	TE1	0002-0 PCT.	0827	0053	6.41	2
010045860	ACT	TE2	0001-0 PCT.	0405	0037	9.14	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 517507 DETECTOR TA1537 SPECIES SPRDAW/RAT

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	0806	0088	10.92	0
010045860	ACT	LU2	0002-0 PCT.	0583	0050	8.58	0



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 511801 DETECTOR TA1538 SPECIES SPRDAW/RAT

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0926	0044	4.75	0
	A+T		***NO MATCH***	0792	0052	6.57	0
	A-C		DMSO	0707	0064	9.05	0
	ACP	LI	AAF 800 UG/ML	0718	0146	20.33	2
	ACP	LU	AAF 800 UG/ML	0833	0073	8.76	0
	ACP	TE	AAF 800 UG/ML	0886	0060	6.77	2
010045860	ACT	LI1	0002-0 PCT.	0600	0051	8.50	2
010045860	ACT	LI2	0001-0 PCT.	0350	0044	12.57	0
010045860	ACT	LU1	0002-0 PCT.	0646	0054	8.36	0
010045860	ACT	LU2	0001-0 PCT.	0682	0057	8.36	0
010045860	ACT	TE1	0002-0 PCT.	0647	0034	5.26	0
010045860	ACT	TE2	0001-0 PCT.	0644	0043	6.68	2



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 512501 DETECTOR 0000D4 SPECIES SPRDAW/RAT

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	1438	0041	0016	2.85	1.11	0
	A+T		***NO MATCH***	0906	0022	0015	2.43	1.66	7
	A-C		SALINE	1044	0028	0015	2.68	1.44	0
	ACP	LI	DMN 90 UM/ML	1177	0053	0052	4.50	4.42	6
	ACP	LU	DMN 90 UM/ML	1167	0029	0012	2.49	1.03	0
	ACP	TE	DMN 90 UM/ML	1203	0039	0020	3.24	1.66	0
010045860	ACT	LI1	0025-1 PCT.	0855	0028	0020	3.27	2.34	6
010045860	ACT	LI2	0125-2 PCT.	1042	0020	0015	1.92	1.44	4
010045860	ACT	LU1	0025-1 PCT.	1037	0019	0021	1.83	2.03	0
010045860	ACT	LU2	0125-2 PCT.	1151	0021	0017	1.82	1.48	0
010045860	ACT	TE1	0025-1 PCT.	1156	0020	0018	1.73	1.56	4
010045860	ACT	TE2	0125-2 PCT.	0976	0028	0008	2.87	0.82	3



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REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 509901 DETECTOR TA1535 SPECIES RHESUS/MONKEY

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0756	0034	4.50	0
	A+T		***NO MATCH***	0534	0030	5.62	0
	A-C		SALINE	0479	0037	7.72	1
	ACP	LI	DMN 50 UM/ML	0458	5473	1194.98	0
	ACP	LU	DMN 50 UM/ML	0551	0032	5.81	0
	ACP	TE	DMN 50 UM/ML	0426	0017	3.99	2
010045860	ACT	LI1	0002-0 PCT.	1041	0050	4.80	0
010045860	ACT	LI2	0001-0 PCT.	1110	0034	3.06	0
010045860	ACT	LU1	0002-0 PCT.	1288	0040	3.11	2
010045860	ACT	LU2	0001-0 PCT.	1005	0028	2.79	2
010045860	ACT	TE1	0002-0 PCT.	1143	0015	1.31	2
010045860	ACT	TE2	0001-0 PCT.	1179	0036	3.05	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 511901 DETECTOR TA1537 SPECIES RHESUS/MONKEY

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0692	0044	6.36	0
	A+T		***NO MATCH***	0638	0025	3.92	0
	A-C		DMSO	0533	0030	5.63	0
	ACP	LI	AAF 800 UG/ML	0606	0064	10.56	0
	ACP	LU	AAF 800 UG/ML	0643	0036	5.60	0
	ACP	TE	AAF 800 UG/ML	0545	0045	8.26	0
010045860	ACT	LI1	0002-0 PCT.	0696	0022	3.16	0
010045860	ACT	LI2	0001-0 PCT.	0432	0024	5.56	0
010045860	ACT	LU1	0002-0 PCT.	0831	0028	3.37	0
010045860	ACT	LU2	0001-0 PCT.	0478	0022	4.60	0
010045860	ACT	TE1	0002-0 PCT.	0701	0034	4.85	0
010045860	ACT	TE2	0001-0 PCT.	0504	0028	5.56	0



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 510001 DETECTOR TA1538 SPECIES RHESUS/MONKEY

DATE.- 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0748	0078	10.43	0
	A+T		***NO MATCH***	0742	0043	5.80	2
	A-C		DMSO	0742	0020	2.70	2
	ACP	LI	AAF 800 UG/ML	0638	0348	54.55	0
	ACP	LU	AAF 800 UG/ML	0901	0047	5.22	0
	ACP	TE	AAF 800 UG/ML	0681	0045	6.61	0
010045860	ACT	LI1	0002-0 PCT.	0562	0040	7.12	0
010045860	ACT	LI2	0001-0 PCT.	0595	0035	5.88	2
010045860	ACT	LU1	0002-0 PCT.	1144	0024	2.10	2
010045860	ACT	LU2	0001-0 PCT.	0819	0022	2.69	2
010045860	ACT	TE1	0002-0 PCT.	0854	0034	3.98	2
010045860	ACT	TE2	0001-0 PCT.	0829	0037	4.46	2



BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 514202 DETECTOR 0000D4 SPECIES RHESUS/MONKEY

DATE - 07/11/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0658	0012	0012	1.82	1.82	1
	A+T		***NO MATCH***	0695	0018	0019	2.59	2.73	1
	A-C		SALINE	0555	0012	0010	2.16	1.80	7
	ACP	LI	DMN 90 UM/ML	0799	0051	0030	6.38	3.75	0
	ACP	LU	DMN 90 UM/ML	0832	0020	0022	2.40	2.64	1
	ACP	TE	DMN 90 UM/ML	0739	0040	0017	5.41	2.30	4
010045860	ACT	LI1	0025-1 PCT.	0722	0025	0008	3.46	1.11	4
010045860	ACT	LI2	0125-2 PCT.	0622	0016	0010	2.57	1.61	0
010045860	ACT	LU1	0025-1 PCT.	0874	0016	0025	1.83	2.86	5
010045860	ACT	LU2	0125-2 PCT.	0852	0017	0019	2.00	2.23	0
010045860	ACT	TE1	0025-1 PCT.	0701	0013	0021	1.85	3.00	0
010045860	ACT	TE2	0125-2 PCT.	0840	0012	0018	1.43	2.14	0